REMARKS

Claims 1 and 4 are currently pending. By this response to the non-final Office Action mailed on January 2, 2008, claims 1 and 4 have been amended. Care has been taken to avoid the introduction of new matter. Favorable reconsideration of the application in light of the following comments is respectfully solicited.

Note Regarding Identification of Meltser et al.

Applicants note that the Office Action and Notice of References Cited erroneously identify U.S. Patent App. Pub. No. 2004/0137258 as Meltser et al. However, the correct publication is U.S. Patent App. Pub. No. 2004/0137285.

Rejections Under 35 U.S.C. § 103(a)

In section 4 of the Office Action, claims 1 and 4 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Japanese Patent App. Pub. No. H11-354143 (Saito) in view of U.S. Patent App. Pub. No. 2004/0038098 (Imamura) and U.S. Patent App. Pub. No. 2004/0137285 (Meltser). Applicants respectfully traverse.

Claim 1 recites, *inter alia*, that

> wherein the differential pressure **ΔP is defined as $\Delta P = Pa - Pc$**, and the differential pressure during operation ΔPo and the differential pressure during the purge operation ΔPp satisfy the relations: **$0 < \Delta Po \times \Delta Pp$** and $|\Delta Pp| \leq |\Delta Po|$.

In order to satisfy the relationship "$0 < \Delta Po \times \Delta Pp$," ΔPo and ΔPp must either (1) both be greater than zero, or (2) both be less than zero. In other words, during operation and the purge operation, the pressure of one of the anode side and the cathode side of the electrolytic

membrane is controlled so that it is constantly larger than the pressure of the other side, avoiding reversal of the relation of Pa and Pc (*i.e.*, which one is greater). As disclosed by the instant application, this suppresses degradation of the polymer membrane caused by the vibration thereof which occurs during start-up or shut-down purging. In conventional purging operations, the above reversal is not avoided. Accordingly, a device according to claim 1 provides high reliability in spite of long-term operation subjected to start-ups and shut-downs.

Neither Saito not Imamura disclose preventing a reversal of the relation between Pa and Pc. Saito merely teaches providing cutoff valve 46 for the nitrogen supply line 12 that supplies nitrogen gas to the anode side, and opening the cutoff valve 46 when the system is shut down. In Imamura the pressure difference between the pressure of oxidant gas and the pressure of fuel gas is controlled in order to prevent a drop in power generated by the cell due to accumulation of water in the electrode and insufficient hydration of the electrolyte membrane and to facilitate the removal of water accumulated in the electrodes and the hydration of the electrolyte membrane (*see* ¶ [0010]). However, Imamura also discloses that "**the pressure difference** between the air pressure and the hydrogen pressure is controlled through the regulating valves so that **a minimum hydrogen pressure becomes higher than a maximum air pressure, or** so that **a minimum air pressure becomes higher than a maximum hydrogen pressure**" (Abstract; *see also* ¶ [0025]). Thus, the Office Action incorrectly asserts at page 4, lines 17-19 and page 5, lines 16-18 that, that in view of Imamura one of ordinary skill in the art would understand Pa > Pc, such that ΔPo or ΔPp "**must** be greater than 0 (zero)." Instead, as noted above, Imamura discloses the use of *both* positive and negative ΔP values.

Meltser does not cure the above shortcoming, as it does not disclose preventing a reversal of the relation between Pa and Pc. Instead, Meltser merely discloses avoiding "significant

pressure differential between the anode and cathode sides," as "[i]f the pressure differential is of a sufficient magnitude, the membrane . . . can be damaged" (¶ [0006]). However, Meltser only discloses controlling the *magnitude* of ΔP, and does not suggest preventing a reversal of the relation between Pa and Pc, as required by relation "$0 < \Delta Po \times \Delta Pp$" recited in claim 1. Thus, the limitations recited in the last paragraph of claim 1 are not obvious in view of the combination of Saito, Imamura, and Meltser proposed by the Office Action.

Additionally, claim 1 recites, *inter alia*, "**variably** controlling the flow rate of the inert gas supplied to said fuel cell." In rejecting claim 1 as previously presented, the Office Action asserts that Saito's cutoff valve 46 teaches "control means for increasing or decreasing the amount of the purge gas supplied to said fuel cell" (Office Action, page 3, lines 10-12). However, *cutoff* valve 46 **merely turns on or off** the supply of nitrogen. In contrast, Saito discloses other devices, flow control valves 47-48 (¶ [0016]), which are capable of *varying* the rate at which a gas is supplied. Thus, cutoff valve 46, which the Office Action relies upon, does not "**variably** controlling the flow rate of the inert gas supplied to said fuel cell," as recited in claim 1.

Further, claim 1 recites, *inter alia*,

> means for measuring a pressure **Pa in an inlet-side flow path leading to the anode** of said fuel cell and a pressure **Pc in an inlet-side flow path leading to the cathode**
> . . .
> variably **controlling the flow rate of the inert gas** supplied to said fuel cell **based on the values of Pa and Pc** during the purge operation of said fuel cell.

The Office Action asserts that reference numerals 71 and 81, illustrated in Imamura, FIG. 9, disclose the above limitations (Office Action, page 3, line 19 to page 4, line 3). However,

Imamura does not disclose what is claimed. Although FIG. 9 discloses pressure sensors 71 (Pain), 72 (Paout), 81 (Phin), and 82 (Phout) at the inlets and outlets of the anode and cathode, Imamura does not disclose "controlling the flow rate of the inert gas . . . based on the values of [measured anode **inlet-side** pressure] Pa **and** [measured cathode **inlet-side** pressure] Pc" (*i.e.*, sensors 71 and 81, according to the Office Action). As illustrated in FIG. 10, comparisons and control operations are made on the basis of *either* (1) the combination of Phout (82) + Pain (71) (steps S221-S223) or (2) the combination of Phin (81) + Paout (72) (steps S230-S232), depending on the determination of step S220 (excess water condition). As Imamura notes that "Pain>Paout due to the ventilation resistance" (¶ [0119]) and "Phin>Phout due to the ventilation resistance" (¶ [0120]), the input and output pressure readings cannot simply be swapped. If the readings were equivalent or readily interchangeable, it would make no sense to employ sensors at all four locations. Thus, Imamura does not disclose "controlling the flow rate of the inert gas . . . based on the values of Pa and Pc," where Pa and Pc are both measured on inlet sides.

Meltser and Saito do not cure this deficiency. In Meltser, both pressure transducers 46 and 48 are (1) *only on the anode side* of the fuel cell, and (2) *only on the outlet side* of the fuel cell (*e.g.*, "on respective . . . sides of valve 42") (*see* Meltser, ¶ [0021]). Thus, they do not satisfy the claimed limitations. Regarding Saito, the Office Action further acknowledges that Saito "fails to teach a means for measuring pressure at the inlet-side flow paths leading to the anode and the cathode" (Office Action, page 3, lines 12-14). Thus the combination of Imamura, Saito, and Meltser proposed by the Office Action fails to disclose or suggest "controlling the flow rate of the inert gas," as recited in claim 1.

As discussed above, the combination of Saito, Imamura, and Meltser proposed by the Office Action is unable to sustain a *prima facie* case of obviousness, as even in combination, the references do not make obvious a number of claimed limitations. Thus, Applicants respectfully request withdrawal of the rejection of claim 1 under 35 U.S.C. § 103(a). Additionally, as "dependent claims are nonobvious if the independent claims from which they depend are nonobvious" (*In re Fritch*, 972 F.2d 1260, 1266 (Fed. Cir. 1992)), Applicants further request withdrawal of the rejection of claim 4.

Claim 4 recites, *inter alia*, "means for **changing the internal diameter** of an outlet-side flow path of an exhaust gas from said fuel cell **at least in stages**." The Office Action asserts that Meltser's valve 42 discloses "means for changing the internal diameter," as recited in claim 4 as previously presented. However, Meltser only discloses that "[v]alve 42 is normally closed" (¶ [0020]) and "[d]uring the purging operation, valve 42 is opened" (¶¶ [0020]-[0021]) – in other words, it acts much like cutoff valve 46 of Saito, discussed above, in that it is only disclosed in use as fully open or fully closed. Thus, Meltser does not disclose (1) "changing the internal diameter," or, at least, (2) changing it "at least in stages." Therefore, Meltser is unable to sustain the *prima facie* case of obviousness asserted in the Office Action, and Applicants respectfully request withdrawal of the rejection of claim 4.

Accordingly, it is urged that the application, as now amended, is in condition for allowance, an indication of which is respectfully solicited. If there are any outstanding issues that might be resolved by an interview or an Examiner's amendment, Examiner is requested to call Applicants' attorney at the telephone number shown below.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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